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FY 2004 SUPERFUND ANNUAL REPORT

September 2005

III. Trends and Technology Innovation

Trends

On September 30, 2004, the Superfund program completed its 24th year. EPA has increased its focus on allocating and leveraging funding for site-specific activities. The Superfund program streamlined its processes; ensured that the worst sites are addressed first, with the ranking and prioritizing of sites; and sought other financial avenues for cleanup through enforcement actions that support the “enforcement first” principle. Throughout all Superfund programmatic activities, EPA and the Regions work closely with the local community to build early and meaningful involvement.

Four different trends in financial management, streamlined decision-making, enforcement, and programmatic accomplishments are discussed below.

Trend 1 – EPA increased cost management in response to increased demand for cleanup.

The Superfund program, like all Federal programs, must operate within the funding levels provided by annual Congressional appropriations. The Superfund program often completes short-term actions to mitigate health threats at sites pending completion of investigations and the start of long-term cleanup construction. However, many Superfund sites pose serious continuing and documented public health risks requiring long-term measures as well. For example, the Agency is cleaning areas where residents were found with high body burdens of lead (a heavy metal that is hazardous to health if breathed or swallowed; its use in gasoline, paints, and plumbing compounds was sharply restricted or eliminated by Federal laws and regulations), arsenic (a naturally occurring element found throughout the environment), and other contaminants. This exposure impairs children’s physical and cognitive development and can have a variety of impacts on adults. In addition, since its inception, the Superfund program has provided alternative sources of drinking water to nearly 615,000 people near both National Priorities List and non-National Priorities List sites where existing water supplies were unsafe because of contamination. Under these conditions, EPA carefully allocates the Superfund budget across all program activities.

Changes in the program (e.g., more complicated sites, larger sites, longer schedules) lead to budgetary pressures. The trend toward more projects ready for construction than those for which funding is available requires the Agency to seek additional cost efficiencies in the program, while maintaining protection of human health and the environment. To accomplish this, the Agency initiated action in four areas of cost management. First, the Agency continued its **efforts to ensure that the people responsible for the contamination pay** for or conduct the cleanup work. In FY 2004, the Agency augmented its appropriated cleanup funding with \$109 million from responsible party settlements and used the funds for construction and post-construction activities.

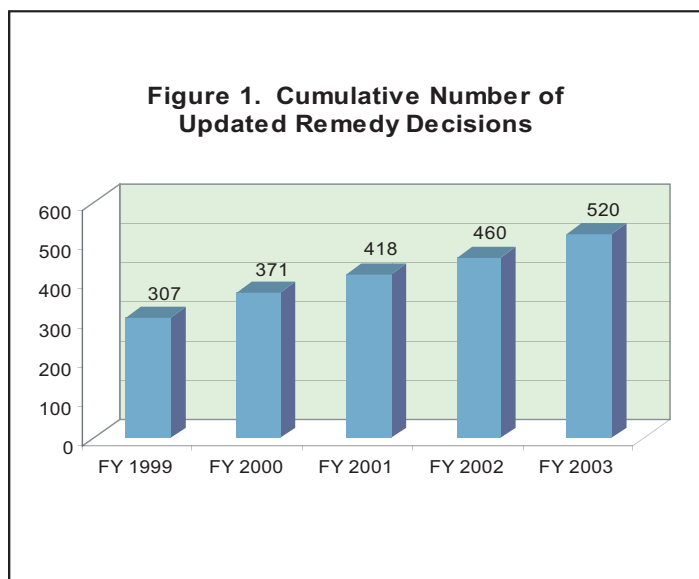
EPA is **getting the most out of Superfund money** by ensuring that program resources are used effectively and efficiently. Superfund appropriations since the inception of the program exceed \$27 billion. Historically, some funds remain in cleanup agreements with States and contracts with private companies for work no longer required. Through an aggressive effort to deobligate prior year’s funds from contracts, grants, cooperative agreements (assistance agreements whereby EPA transfers money, property, services, or anything of value to a State, university, non-profit, or not-for-profit organization for the accomplishment of authorized activities or tasks), and interagency agreements, EPA recaptured \$79 million. In FY 2004 Superfund used these funds for long-term construction, site investigations, remedy selection, emergency response, and other activities.

Third, EPA is working to **increase the efficiency and effectiveness of remedies** by reviewing and improving high cost remedies and paying careful attention to design and operation.

- EPA established the Contaminated Sediments Technical Advisory Group, comprised of Agency experts, to monitor the progress of and provide advice to Regions regarding a select group of large, complex, or controversial contaminated sediment Superfund sites, prior to the selection of remedies at sites with potentially high costs.
- Superfund's ongoing efforts to update remedies continued to play a significant role in saving money for the program and for private parties during remedy design, construction, and operation and maintenance. In FY 2003, because of changes in science, technology or new information, EPA updated 60 remedies, generating cost savings estimated to exceed \$85 million. Since the inception of these reviews in FY 1996, EPA has updated over 500 remedies, reducing estimated cleanup costs by more than \$1.8 billion. See Figure 1 for the cumulative number of updated remedy decisions from FY 1999 through FY 2003.
- Superfund also developed new cost estimating tools to use during design and is reviewing and modifying contaminated ground water treatment systems in an effort to save about \$4.8 million a year.

Fourth, EPA is **utilizing new technology for site management**. EPA continues to encourage the development of new, more effective technologies (particularly using computer capabilities) and the sharing of information on these technologies within the industry. For example, EPA is exploring the Triad Approach (using: (1) systematic project planning, (2) dynamic work plan strategy, and (3) real-time measurement technologies) for site investigation. This approach uses more real time sample analysis and decision-making, and holds great potential for cost savings, time savings and less uncertainty in site evaluations, including the remedial investigation.

These activities are accomplished within the framework of the Agency's priorities for providing remedial action or long-term cleanup funding. Superfund's most important long-term cleanup priority is to continue work on projects underway, with construction equipment and staff onsite. The amount of funding for new projects is based on the health threat posed and the need to finish work at an entire site. This goal drives the cost management initiatives Superfund is undertaking.



EPA put in place all of these activities to find and use every dollar and resource available to clean up contaminated sites and protect human health. However, the size, complexity and cost of sites under construction or ready to begin construction continue to grow. In fact, in FY 2004, EPA committed more than 52 percent of the Superfund obligations for long-term, ongoing cleanup work at just nine sites. The Agency expects a similar situation in FY 2005.

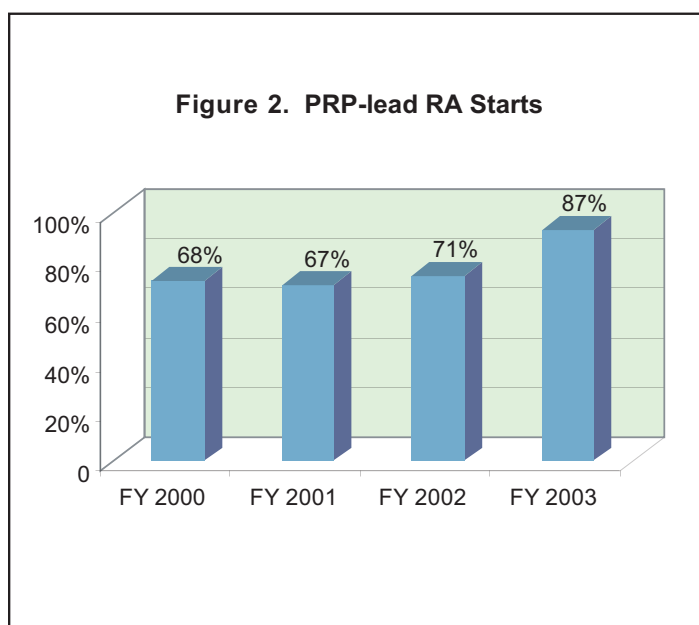
Nonetheless, the Agency responds to sites that pose an immediate threat to human health and the environment. EPA continues to monitor sites for any changes in site conditions and will act to address such threats. As stated above, Superfund's removal and emergency response program started 385 removal cleanup actions in FY 2004 and has completed more than 8,286 removals at hazardous waste sites to immediately reduce their threat to human health and the environment.

Program resources must be managed carefully given the added responsibilities of Superfund's emergency response under the National Response Plan. On September 11, 2001, EPA emergency personnel were on their way to New York City before the second plane hit the World Trade Center. Later, EPA was put in charge of cleaning up the anthrax (an acute infectious disease caused by the spore-forming bacterium *Bacillus anthracis*) contamination in the Hart Senate Office Building in Washington, D.C. When the space shuttle Columbia disintegrated over Texas, EPA's emergency responders were called to the scene. EPA is often predeployed at national events in case of a terrorist attack. These new responsibilities are placing new pressures on staff as they train and prepare to address a long list of possible emergencies – chemical, radiological, and biological.

Trend 2 – EPA leveraged potentially responsible party performance and financing for response actions.

As part of EPA's efforts to leverage funds for Superfund activities, settlements with responsible parties are increasingly important. Under its "enforcement first" principle, EPA actively seeks responsible parties and remains committed to continuing this effort. Through response settlements, the use of interest-bearing special accounts, and cost-recovery settlements, EPA is able to initiate additional site activities. Cashout settlements (cash payments in resolution of liability for both past and future costs) that designate funds to a special account, de minimis settlements, and orphan share compensation are tools that assist EPA in working with responsible parties to reach a funding agreement for cleanup.

Figure 2 depicts the increase in the percentage of remedial action starts undertaken by responsible parties from FY 2000 through FY 2003. In FY 2004, EPA created a new measure and began reporting the percentage of remedial actions or long-term cleanups at non-Federal Superfund sites with known, viable, liable parties where settlements were reached or enforcement actions were taken in time to start the remedial action or long-term cleanup during the fiscal year. For the first year under this new measure, settlement was reached at 98 percent of the applicable sites.



The number of settlements with funds collected for site-specific special accounts and the total amount of those funds in special accounts both steadily increased in recent years. By FY 2004, EPA collected approximately \$1.3 billion, established 451 special accounts, and accrued over \$185 million in interest. Roughly one-half of the increase in the amounts deposited in special accounts was between FY 2000 - FY 2004. In FY 2004 alone, EPA established more than 20 percent of the special accounts. Figure 3 shows the increase in the number of special accounts from FY 2000 through FY 2004.

The Agency strives to ensure that it reviews the cost-recovery potential of every case with significant EPA funded project expenditures before the Government's potential claim is extinguished by the statute of limitations. For each case where EPA's total past costs exceed \$200,000, the Agency attempts to either settle with the responsible parties, file a claim against them, or formally document its reasons for waiving cost recovery before the potential expiration of the statutes of limitations. For each of the last five years, the Agency has addressed between 98 and 100 percent of such cases before their potential statutes of limitations expiration date and has had great success in recovering costs in these cases.

Private party commitments played an integral role in funding cleanups. Since its inception, EPA has achieved more than \$8 in private party cleanup commitments and cost recovery, for every \$1 spent on Superfund civil enforcement (see Figure 4). In FY 2004 EPA negotiated \$523 million in private party commitments for future response work, including cashouts and \$157 million in private party commitments for EPA's past costs.

Figure 3. Number of Special Accounts Established (FY2000 - FY2004)

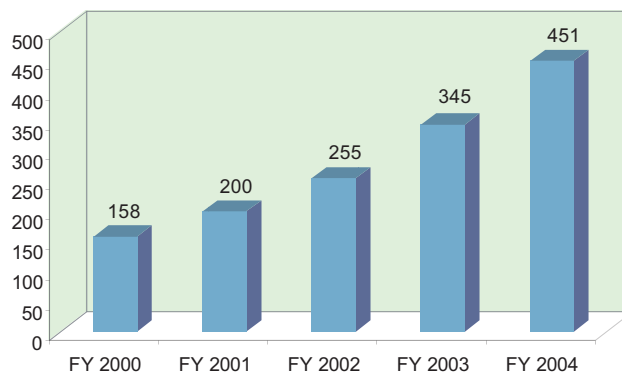
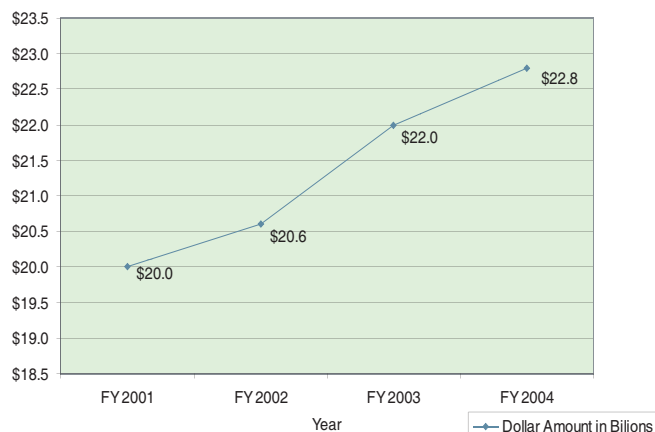


Figure 4: Increase in Private Party Commitments Since Inception of Program (cumulative)

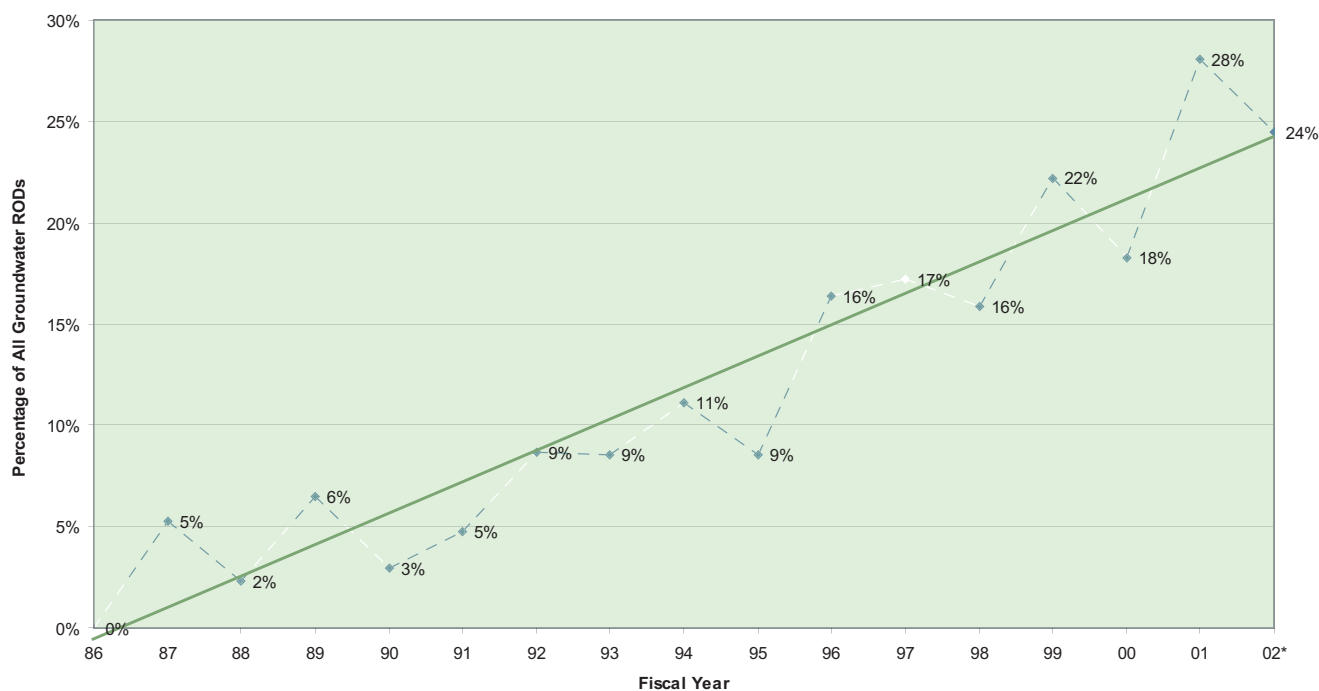


Trend 3 – The number of projects for which EPA selected in situ remediation technologies increased.

At sites, where previously the only remedial option was removal and off-site disposal, EPA now has additional alternatives such as in situ or onsite treatment of contaminants. EPA documented ways in situ remediation options often efficiently target the actual sources of contamination and reduce the time required for cleanup. Having a larger tool box of remediation options allowed EPA to develop unique cleanup plans that are more likely to restore sites to a specific use.

Figure 5 depicts the steady increase in the percentage of ground water remedies with in situ treatment selected. This upward trend is due to several factors, including more widespread acceptance of these treatment technologies and the reduced operations and maintenance costs. EPA also found that in situ treatment effectively addressed contaminants that historically were difficult to remediate, such as dense nonaqueous phase liquids and chlorinated solvents.

Figure 5. Superfund Remedial Actions: Trends in the Selection of In Situ Treatment for Ground Water (FY 1986-2002)*



ROD = Record of Decision

* Includes information from an estimated 70% of FY 2002 RODs.

RODs Selecting In Situ Treatment

Linear (RODs Selecting In Situ Treatment)

Trend 4 – EPA reduced threats to human health.

The Superfund program fulfills the important environmental mission of reducing risks to human health and the environment posed by dangerous chemicals, pollutants, and contaminants in the air, soil, and water. When ground water drinking supplies or residential soil is contaminated with hazardous wastes, the public is faced with an immediate and direct threat to health. Superfund's performance measures for environmental indicators (i.e., Human Exposures Under Control and Ground Water Migration Under Control) demonstrate the cumulative impact the program has already had on the universe of sites to be addressed. These measures are an additional way to see the program's incremental progress protecting human health and the environment each year.

In FY 2004, the Superfund program protected public health through response activities that reduced current, direct human exposures to hazardous pollutants. At the close of FY 2004, human exposures were under control at 83 percent (1,242 of 1,493 sites with human health exposures) of affected National Priorities List sites, meaning that protective controls were in place to prevent any unacceptable human exposures under current land and ground water use. EPA is conducting further study or cleanup work at the remaining sites. At the [Ace Services Site](#) in Colby, KS, a former chrome-plating facility, chromium (a heavy metal) contamination threatened the local drinking water supply. EPA and the State of Kansas are now providing water connections to replace contaminated private wells with city water to protect the health of residents and the environment. In addition, the migration of contaminated ground water was under control at 67 percent (875 of 1,306 sites with ground water contamination) of National Priorities List sites by the close of FY 2004.

In the period from FY 2002, when data were first collected on human exposures under control and ground water migration under control, to the present, EPA has made substantial progress. Since FY 2002, an additional 43 sites have human exposures controlled and an additional 103 sites have ground water migration controlled. These accomplishments translate into tangible environmental results for the protection of human health (see Figures 6 and 7).

Figure 6. Increases in Superfund Sites with Human Exposures Under Control

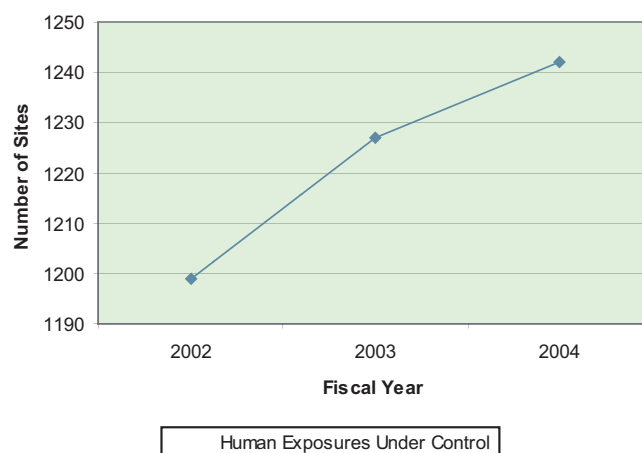
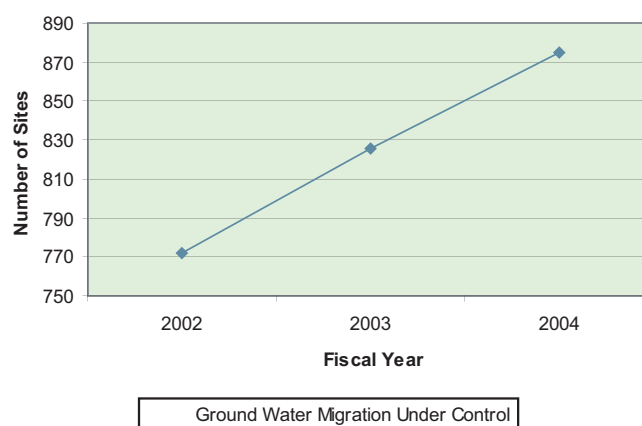


Figure 7. Increases in Superfund Sites with Ground Water Migration Under Control



Tangible environmental benefits are also demonstrated by the return of formerly contaminated land to productive reuse. On November 5, 2004, EPA issued guidance to its regional offices (Guidance for Documenting and Reporting the Superfund Revitalization Performance Measures, Office of Solid Waste and Emergency Response 9202.1-26) instructing them in the use of two new performance measures to document and report EPA's Superfund Land Revitalization accomplishments. The two measures are: the number of acres of land at Superfund sites ready for reuse and the number of Superfund sites with land ready for reuse.

In October 2004, using these performance measures, EPA partially quantified its success in making land ready for reuse over the life of the Superfund program. It identified 244,000 acres of land in use or made ready for reuse at non-Federal facility Superfund sites. Other Federal agencies identified over 400,000 acres as available for reuse. Twenty-one percent of this land is ready for residential use, and 79 percent is ready for nonresidential use. EPA also identified 420 sites with land ready for reuse, of which 226 sites are already in use.

In FY 2005, EPA will continue to gather current and historical data on land and sites ready for reuse as a result of Superfund cleanups, to establish a baseline against which it can track the effectiveness of its current activities in making land ready for reuse. EPA will also continue to increase its emphasis on incorporating future land use into the cleanup process at Superfund sites, to accommodate long-term use of sites without compromising the protection of human health and the environment.

New Techniques and Technologies

Superfund Innovations in Sediment Cleanup

Superfund is a vehicle for innovation in evaluating and cleaning up contaminated sediments. Through the work of Superfund personnel and through partnerships with other Federal agencies, States, and industry, Superfund improved characterization techniques, piloted unconventional designs, tested new construction techniques, and developed new ways to incorporate community reuse opportunities into cleanup designs. Examples of innovations include:

- EPA worked with the U.S. Army Corps of Engineers, the U.S. Navy, and the Department of Energy to undertake innovative investigations using [EPA's Triad Approach](#). Using the time and cost efficiencies inherent in the Triad Approach, project teams delineated the contribution and extent of various sources of contaminants to water bodies at a number of sites. At the [Lower Duwamish River](#) in Seattle, WA, EPA also used the Triad Approach to test the reliability of collaborative analytical methods.
- In partnership with States and local health agencies, EPA has developed novel outreach and health education programs to protect fish and shellfish consumers at many sites. At the [New Bedford Site](#) in Massachusetts, EPA also partners with the local healthcare and social service providers, schools, and marina and bait businesses to raise people's awareness of the health risks from eating PCB-contaminated seafood, specifically targeting women of childbearing years and children, as well as the general fishing community.
- At the [Fox River](#) site in Wisconsin, EPA and responsible party contractors are testing the largest deployment yet undertaken of a geotube (large bags made from a high tensile strength woven polypropylene geotextile) method for dewatering contaminated sediment. If it continues to be as successful as early data indicate, this method may significantly reduce the cost of dewatering sediment at large dredging projects.

- The Superfund program was instrumental in promoting new solutions which meet both remediation and restoration goals. In coordination with trustee agencies and communities, EPA identified creative ways, at a number of sites, to incorporate habitat restoration into Superfund cleanup.
- In partnership with the Office of Research and Development's [Hazardous Substance Research Center–South-Southwest](#), EPA supported research into new capping designs which incorporate features to actively treat or sequester contaminants in the [Anacostia River](#) in Washington, DC. This research can lead to increased circumstances in which capping is a protective method to manage contaminated sediments in place.
- At a number of sites, EPA has developed new ways to excavate contaminated sediments in dry conditions, improving the accuracy of excavation. For example, at the [GE Housatonic River Site](#) shallow bedrock (a general term for any consolidated rock) prevented the installation of sheetpile cofferdams (a watertight enclosure from which water is pumped to expose the bottom of a body of water and permit construction made of sheetpile). EPA and its contractor designed and constructed a temporary dam with a pipe bypass system. The dam backed up the river and funneled the water through gravity-flow pipes placed in the riverbed itself. By moving the pipes to one side of the river and then the other, both sides could be excavated without major reconstruction of the bypass system.
- Through partnership with industry in the Remedial Technologies Development Forum, EPA supported development of a framework for assessment of monitored natural recovery of contaminated sediments, which is described in EPA's draft [Contaminated Sediment Remediation Guidance for Hazardous Waste Sites](#), peer reviewed in the spring of 2005.
- At the New Bedford Superfund Site, EPA and its contractors developed a pioneering method to improve the accuracy of assessing public health risks from dredging operations through a system of monitoring and tracking airborne PCB exposure, then comparing it to a health-based long-term exposure budget. The method is working well to ensure protection of the local community during a large dredging operation.
- In partnership with local communities at a number of sites, EPA incorporated innovative future land uses into the design of facilities to be constructed for the cleanup including port and transportation infrastructure and piers. At the New Bedford Site, EPA also instituted innovative programs to share construction costs where combined sewer overflows (sewers that are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same pipe) or power cable movement was necessary and the local government desired other changes to these systems.
- A number of Superfund sediment sites have Records of Decision which specify pioneering sediment cleanup levels that are more scientifically sound than simple numerical limits. For example, at the Fox River site, EPA and the Wisconsin Department of Natural Resources developed concentration-based sediment levels to be evaluated with surface-weighted average (concentration weighting for soft sediment deposits and hard sediment areas) limits. These took into account the feeding patterns of fish, with alternatives built into the decision tree, giving the project team flexibility to cost effectively meet cleanup levels.
- In cooperation with industry partners of the [Remediation Technologies Development Forum](#), EPA organized a workshop evaluating the application and status of inventive in situ treatment technologies at contaminated sediment sites. More than 100 participants gathered to discuss opportunities for further development of these technologies.